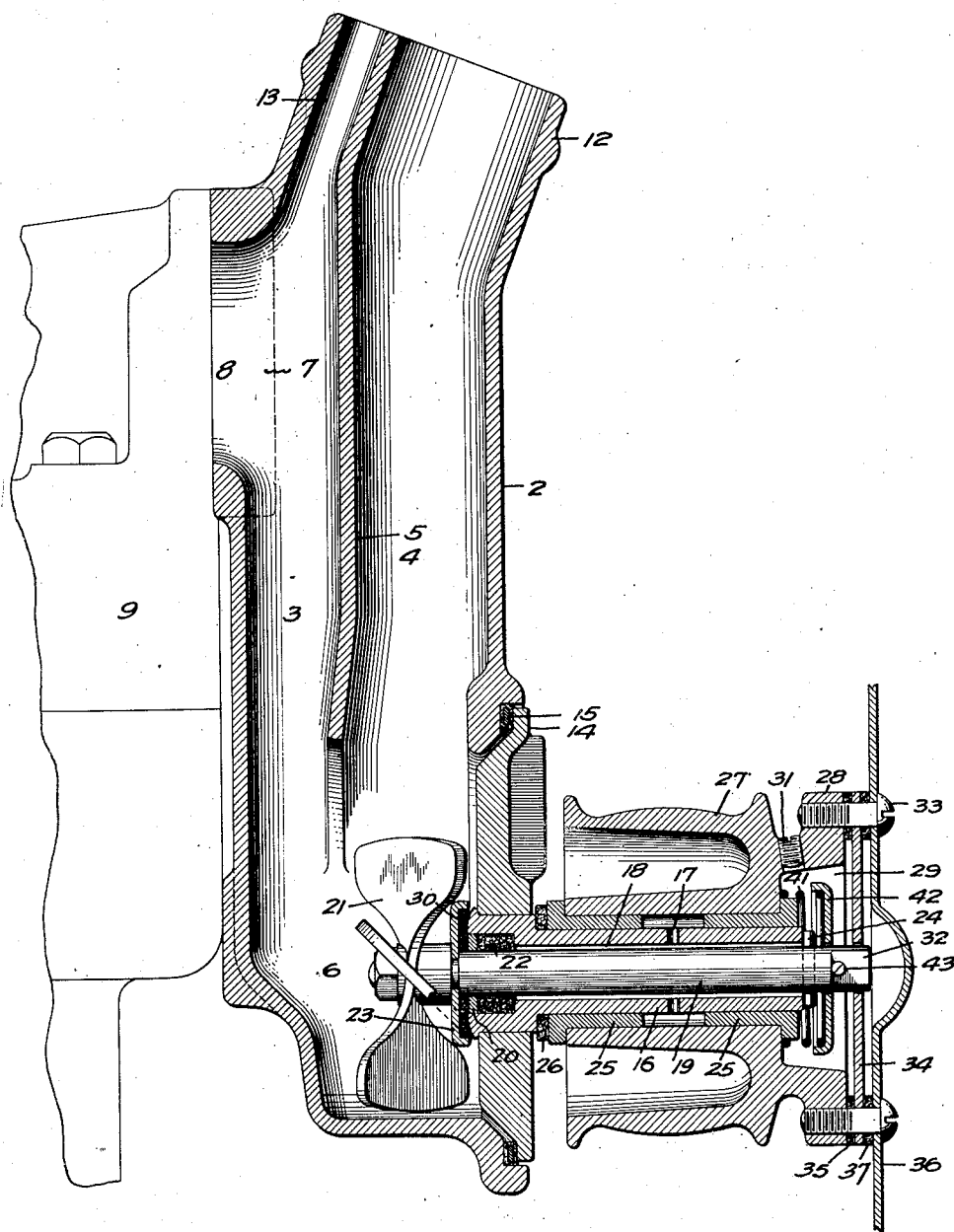


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K. FREITAG
CIRCULATING PUMP
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INVENTOR
K. Freitag
BY
White Post Evans
his ATTORNEYS.

H. Sherburne

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UNITED STATES PATENT OFFICE.

KNUD FREITAG, OF OAKLAND, CALIFORNIA.

CIRCULATING PUMP.

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To all whom it may concern:

Be it known that I, KNUD FREITAG, a citizen of the United States, and a resident of Oakland, county of Alameda, and State of California, have invented a certain new and useful Circulating Pump, of which the following is a specification.

The invention relates to a circulating pump for circulating the water in the cooling system of an internal combustion engine and particularly to the means for driving said pump.

An object of the invention is to provide a pump for circulating the water in the cooling system of an automobile engine, with a lubricating system which will maintain the pump drive properly lubricated.

Another object of the invention is to provide a circulating pump particularly adapted for use on Ford automobiles and in which a number of Ford parts are used, thereby decreasing the cost of installation of the pump.

Another object of the invention is to provide a combined pump and fan drive with means for keeping the drive properly lubricated.

Another object of the invention is to provide means for adjusting the position of the driving pulley so that the driving belt may be maintained taut.

The invention possesses other advantageous features, some of which with the foregoing will be set forth at length in the following description, where I shall outline in full that form of my invention which I have selected for illustration in the drawing accompanying and forming part of the present specification. In said drawing I have shown one type of circulating pump embodying my invention, but it is to be understood that I do not limit myself to the form shown in the drawing, since the invention, as set forth in the claims, may be embodied in a plurality of forms.

The drawing is a vertical section through the pump showing the driving and lubricating means.

Ford automobiles are not regularly equipped with pumps in the cooling system of the engine and in many instances it is desirable to install pumps in such systems to positively circulate the water through the systems. The pump of my invention

is adapted to be secured to the front of the engine block to receive water therefrom and deliver it to the radiator. The pump is driven by the fan belt with which the automobile is regularly equipped and the fan is attached to the pump drive so that the fan pulley serves to drive both the pump and the fan. The construction of the pump of my invention is such that many of the parts with which the automobile is regularly equipped may be used in the combined pump and fan drive, so that when the pump is installed, it is not necessary to discard these parts, thereby reducing the cost of equipping an automobile with the pump of my invention.

The pump comprises a casing 2 which is divided into an inlet passage 3 and an outlet passage 4 by the vertically disposed wall 5 which terminates above the lower end of the casing, thus providing a pump chamber 6 at the lower end of the casing. The casing is provided on its inlet side with a flange 7 which is bolted to the front of the engine block with the inlet opening 8 of the pump in registry with the outlet opening of the circulating system in the engine block 9. At its upper end the casing is provided with a neck 12 which is connected to the upper portion of the radiator by a hose. The dividing wall 5 preferably extends upward to the end of the neck thereby providing a passage 13 connecting the inlet chamber 3 with the hose, so that when the pump is not in operation, any steam formed in the engine block may discharge directly into the radiator without displacing the liquid contained in the casing. The casing is provided in its front wall, adjacent the lower end thereof, with a circular opening which is closed by the circular cover plate 14, any suitable means being employed for holding this plate in tight engagement with the casing. A gasket 15 interposed between the plates and the casing prevents the leakage of water at this point. Mounted eccentrically in the cover plate 14 is a stud bearing 16 which extends forwardly from the casing. The stud bearing is tightly fixed to the cover plate 14 so that no leakage occurs at the joints. The stud bearing is provided with holes 17 through which lubricating oil may freely pass. Disposed within the hollow stud bearings is a shaft

19 to the inner end of which the impeller 21 is secured. The impeller is disposed in the pump chamber 6 and rotation of the impeller causes the discharge of water through the outlet passage 4. At its inner end the said bearing 16 is provided with an enlarged bore and arranged in this bore are a plurality of fiber washers 22 and a brass washer 20, for holding the fiber washers in place. The shaft 19 is of lesser diameter than the interior of the stud bearing 16, forming an annular oil passage 18 surrounding the shaft. The shaft is journaled at its inner end in the fiber washers 22. Leakage of oil into the pump and the passage of water into the stud bearing is prevented by the fiber washer 30 disposed in the cup washer 23 arranged on the shaft 19. By enclosing the fiber washer 30 in the cup washer, the fiber washer is prevented from spreading and is held in tight contact with the shaft 19. The stud bearing is rounded off at its inner edge and in assembly, the fiber washer 30 is worn in against the rounded edge so that it makes a tight joint. The shaft and stud bearing assembly are temporarily held together by the leather pin 24 extending through the shaft.

Mounted on the stud bearing 16 are flanged bushings 25 which form a part of the regular equipment of the automobile. A felt washer 26 is interposed between the inner end of the bushings 25 and the shoulder on the stud bearing 16 to minimize the leakage of oil. The bushings serve to bush the pulley 27 which is the regular fan pulley with which the automobile is equipped and which is removed from its regular assembly and included in the present pump assembly. This regular Ford fan pulley 27 is provided on its outer end with an axially extending flange 28 which forms a lubricant chamber 29 surrounding the shaft 19. The pulley is provided with an aperture normally closed by the screw plug 31 whereby lubricant may be introduced into this chamber. This shaft 19 is formed on its outer end with a non-circular end, preferably rectangular, and the shaft is driven by means engaging this non-circular end 32. Secured to the pulley 27 by screws 33 which form part of the regular Ford equipment, is a drive plate 34 which is provided at its center with a non-circular aperture into which the ends 32 of the shaft extend. The shaft 19 is thus supported and centered at one end by the washers 20 and 22 and at the other end by the plate 34 so that it practically floats in the stud bearing. A gasket 35 is interposed between the end of the pulley and the plate 34 to prevent the leakage of oil at that point. The standard Ford fan is provided with an imperforate center portion and this fan 36 is also secured to the pulley by the screws 33. A gasket 37 is interposed between the fan and the driv-

ing plate 34 thereby preventing leakage of lubricants at that point. Any lubricant which leaks past the non-circular end of the shaft 19 is retained by the central portion of the fan. The lubricant chamber is thus sealed against leakage so that the lubricant is contained therein for a long time, thus properly lubricating the part and preventing undue wear. It appears to be difficult to persuade people to lubricate the wearing parts of their automobiles, particularly the pumps, so that in the past great dissatisfaction has been expressed in regard to circulating pumps, due to the fact that they wear out rapidly. By enclosing the lubricant in a sealed chamber, the pump will operate properly for a long period of time even if additional lubricant is not introduced into the lubricant chamber.

The pulley and the shaft 19 are held in their relative proper positions by means of a coiled spring 41 interposed between the outer face of the pulley in the lubricant chamber and the spring retainer 42 which is held in position on the shaft 19 by the cotter pin 43. This spring exerts an outward pressure on the shaft and an inward pressure on the pulley and holds the impeller and the pulley in proper position. The bushings 25, the pulley 27 and the fan 36 are standard Ford equipments and when it is desired to install the pump of this invention these parts are removed from the Ford and assembled with the other parts of the pump. The pump is of such structure that the axis of the pulley 27 lies in the same position with respect to the fan belt driving pulley, as it does in the regular Ford equipment.

The fan pulley is journaled on the stud bearing 16 and wear due to the rotation of the pulley, occurs at the surfaces of the stud bearing and the bore of the pulley. This wear causes the axis of the pulley to fall slightly with respect to the axis of the bushing, and consequently lowers the outer end of the shaft 19. The shaft 19 is full-floating and is journaled at its inner end only, so that as its outer end sags, it does not engage the bore of the stud bushing and does not serve to journal the pulley, serving only as a drive shaft for the pump. The fiber washers 22 in which the inner end of the shaft is journaled readily conform to the angularity of the shaft, due to wear of the bushing and pulley, and keep the bearing tight, so that water will not leak therethrough into the lubricant chamber. The spring 41 holds the washer 23 to its seat, thus further preventing leakage.

I claim:

1. In a circulating pump, a casing, a hollow stud bearing secured to and extending from said casing, a full-floating shaft extending through said stud bearing and journaled therein at its inner end only, an im-

5 peller on one end of the shaft and disposed within the casing, a pulley journaled on said stud bearing and a plate secured to said pulley and engaging the other end of said shaft.

10 2. In a circulating pump, a casing, a hollow stud bearing secured to and extending from said casing, a shaft extending through said stud bearing, an impeller on one end of the shaft and disposed within the casing, a packing interposed between the shaft and the stud bearing to prevent leakage from the casing into the stud bearing, a pulley journaled on said stud bearing, a spring operatively interposed between said shaft and pulley to exert pressures thereon in the direction of the axis of the shaft to hold the packing in tight engagement with the stud bearing and a plate secured to said pulley and engaging the other end of said shaft.

15 3. In a circulating pump, a casing, a hollow stud bearing secured to and extending from said casing, a full-floating shaft extending through said stud bearing and journaled therein at its inner end only, an impeller on one end of the shaft and disposed within the casing, a pulley journaled on said stud bearing, an axially extending flange on said pulley spaced from said shaft and forming a lubricant chamber within the pulley, and a plate forming a tight joint with said flange to close said chamber and engaging the other end of said shaft.

20 4. In a circulating pump, a casing, a hollow stud bearing secured to and extending from said casing, a shaft extending through said stud bearing and out of bearing engagement therewith, a packing interposed between the shaft and the stud bearing, an impeller on one end of the shaft and disposed within the casing, a pulley journaled on said stud bearing provided with a lubricant chamber surrounding said shaft, a spring disposed in said chamber and operatively interposed between the pulley and the shaft to exert pressures thereon in the direction of the axis of the shaft to hold the packing in tight engagement with the stud bearing and a plate engaging the other end of the shaft and closing said lubricant chamber.

25 5. In a circulating pump, a casing, a hollow stud bearing secured to said casing, a shaft of lesser diameter than the bore of the stud bearing extending through said bearing, an impeller on the inner end of said shaft, a flexible bearing member for the inner end of the shaft only, so that the shaft floats in the stud bearing, a pulley journaled on the stud bearing and a drive plate secured

to the pulley and engaging the outer end of the shaft.

6. In a circulating pump, a casing, a hollow stud bearing secured to said casing, said stud bearing having an enlarged bore at its inner end, a shaft of lesser diameter than the bore of the stud bearing extending through said bearing, an impeller on the inner end of said shaft, packing disposed in said enlarged bore and forming the only journal for said shaft, so that the shaft floats in the stud bearing and driving means engaging the outer end of the shaft.

7. In a circulating pump, a casing, a hollow stud bearing secured to said casing, said stud bearing having an enlarged bore at its inner end, a shaft of lesser diameter than the bore of the stud bearing extending through said bearing, an impeller on the inner end of the shaft, washers disposed in the enlarged bore and forming a flexible bearing for the inner end of the shaft, the shaft being otherwise unsupported by bearings, a packing ring surrounding the shaft and engaging the inner end of the stud bearing, a backing plate for the packing ring, a spring arranged to exert a longitudinal pressure on the shaft to hold said packing ring against the end of the stud bearing and driving means engaging the outer end of the shaft.

8. In a circulating pump, a casing, a hollow stud bearing secured to and extending from said casing, said stud bearing having an enlarged bore at its inner end, a shaft extending through said stud bearing and out of bearing engagement therewith, packing surrounding said shaft and disposed in said enlarged bore and forming a bearing for one end of the shaft, an impeller on the inner end of said shaft, a pulley journaled on said stud bearing, said pulley being provided on one end with a lubricant chamber surrounding the shaft, a drive plate closing said chamber and engaging the other end of the shaft and a fan having an imperforate central portion secured to said pulley and overlying said plate.

9. In a circulating pump, a casing, a hollow stud bearing secured to the casing, a shaft of lesser diameter than the bore of the stud bearing extending through said bearing, a bearing member for the inner end of the shaft arranged in said stud bearing, a pulley journaled on said stud bearing and a drive plate secured to said pulley and engaging the outer end of the shaft to hold the shaft concentrically in said stud bearing.

In testimony whereof, I have hereunto set my hand.

KNUD FREITAG.